Pertanika J. Sci. & Technol. 23 (1): 51 - 59 (2015)

SCIENCE & TECHNOLOGY

Journal homepage: http://www.pertanika.upm.edu.my/

Removal of Dissolved Organic Carbon from Peat Swamp Runoff Using Assorted Tropical Agriculture Biomass

Sim, F. S.*, Mohd Irwan Lu, N. A. L., Lee, Z. E. T. and Mohamed, M.

Faculty of Resource Science and Technology,Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia

ABSTRACT

In this study, agriculture biomass was used to remove dissolved organic matter from peat swamp runoff. The functional groups and morphological properties of 6 tropical agriculture biomasses (coconut husk, rice husk, empty fruit bunch, sago *hampas*, saw dust and banana trunk) in their raw and citric acid–treated states were examined. The Fourier transform infrared (FTIR) spectra showed that various biomasses were typically characterised with lignocellulosic compounds. The spectra analysis further demonstrated that citric acid treatment resulted in the dissolution of lignin and hemicelluloses to various extents where carboxyl groups were also introduced. These changes hypothetically suggest improved adsorption ability. Treatment of peat swamp runoff with various untreated biomasses showed no adsorption. With the modified biomass, adsorption was evidenced, with rice husk illustrating the highest removal efficiency of 60% to 65%.The biosorbent can be used in the water treatment process especially for treating water with a high dissolved organic matter content. The spent sorbent can be subsequently applied as a soil conditioner as the dissolved organic fraction, commonly known as humic matter, possesses important agricultural value.

Keywords: Agriculture biomass, adsorption, citric acid treatment, dissolved organic matter, peat swamp runoff

INTRODUCTION

In Malaysia, peat soil encompasses 7.45% of the total land area of the country, of which 70% is found in Sarawak, the northern part of Borneo Island (Wetlands International, 2010). The water catchment in this area serves as an important source of freshwater supply to settlements and townships residing in the peatland. According to statistics, an estimated 3,000 million litres of water are extracted annually from the streams tainted by peat swamp leachate throughout Sarawak (McCartney & Acreman, 2009). Typically, the water is yellowish to

Article history:
Received: 2 April 2013
Accepted: 25 August 2013

E-mail addresses:
sfsim@frst.unimas.my (Sim, F. S.),
nurulstrikerz@yahoo.com (Mohd Irwan Lu, N. A. L.),
terrilze@gmail.com (Lee, Z. E. T.),
murtedza@gmail.com (Mohamed, M.)
*Corresponding Author

ISSN: 0128-7680